

In-House Composting of Litter

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In 1987 there was an interesting presentation from a turkey operation in the Midwest that was composting their litter between flocks as a means of reducing pathogens and recycling the litter. So intrigued by this program, I repeated the study with broilers. One-year old litter was stacked for three days to allow it to self-heat and this was compared to the untreated litter as well as new pine sawdust bedding. In this preliminary study broilers started on the composted litter had the best body weights of all treatments and the initial bacteria load was similar to fresh pine sawdust. Excited about the potential, several of our poultry companies were contacted about doing a demonstration on this procedure. At that time the industry felt there was adequate quantities of bedding for cleanouts and our health programs did not warrant this added effort by our growers.

Over the past 20 years there has been growing interest in this procedure with limited adoption in some parts of the country. The process goes by many different names; composting, windrowing, pasteurization and biological heat treatment. Once stockpiled, many litter pathogens are reduced or eliminated due to the elevated temperatures, the high ammonia levels and the heat-tolerance microbes in these windrows. In fact, research conducted by the University of Delaware, Auburn University and Louisiana State University suggest this process eliminates Coliforms and Salmonella. It reduces *Clostridium Perfringens*, total aerobic bacteria and total anaerobic bacteria by 50, 10-30, and 60-80 percent, respectively. Some initial results from Delmarva suggest it helps break some disease problems on farms such as Dermatitis. The procedure is also used to inactivate many types of virus in litter such as Laryngotracheitis and Avian Influenza. Growers and companies that have implemented this program report improved bird health and performance, and a significant reduction in darkling beetle populations. Depending on the method of composting, it may reduce ammonia levels in the subsequent flock and either reduce or eliminate the need to crust-out houses. Some have implemented this program as a means of improving poultry health, others to reduce bedding replacement cost, while some areas use it as a waste management reduction strategy.

The timing may be right for the Delmarva poultry industry to seriously consider this program for the following reasons. Due to closure of sawmills and competition for our bedding, we have limited availability of local, low-cost, quality bedding materials for our industry. Our bedding supplies have been supplemented with re-processed wood chips, some of which may not be the best quality. Although a new Delmarva plant to produce pine shavings will come online soon, it too will not be the cheaper sawmill by-products (i.e. sawdust and shavings) we have used for years. Given the disease challenges and reduced performance when reusing litter for years due to limited bedding for more frequent cleanouts and higher cost, composting may provide an opportunity to safely recycle litter. If the disease and ammonia challenges of used litter can be managed via composting, this may provide a waste management opportunity for our region. Instead of total cleanouts every two to five years at times of the year that may require appropriate storage facilities or approved methods for stockpiling litter, we might minimize these challenges with timely, partial, yearly removal of litter. By "cutting the centers" from the house at a times that better sequences with proper timing of land application, we can avoid some current and future environmental challenges. In the coming years expect to see greater

regulatory pressures associated with outside stockpiling of litter, spillage around houses and land application of litter.

Windrowing litter has been done with grader blades on tractors, skid-steer loaders and specially-designed equipment such as the Brown Bear unit shown in Figure 1. For Delmarva grader blades may not be a viable option. Forming a single windrow down the center of the house using a skid-steer loader is an option and it has been used the past year to help break some types of chronic health issues in houses. With this method the cake is added to the mix for the added moisture. Although it will require crusting the house when the piles are re-spread, the volume of cake removed is greatly reduced. Piles formed by this method tend to be slower to heat compared to the aeration equipment. Windrows formed with the aeration equipment pulverizes the litter, cake and hardpan; aerates and forms the compost windrows. It eliminates the need to crust-out houses and appropriate storage of the caked litter. It also avoids any uncontrollable spillage outside houses associated with crust removal. Depending on house width and litter depth, two or three windrows are formed immediately following bird movement. With this method the goal is to achieve 130° F or greater within the first two days and to maintain these windrow temperatures for a minimum of three to five days. The optimum litter moisture is ~35 percent but adequate temperatures are achieved with lower litter moistures. Afterwards, the piles are spread out with a grader blade or skid-steer loader.

There are some challenges with in-house composting of litter between flocks. There must be adequate time between flocks to execute this procedure. At this time in-house composting may not be an option or needed for some growers and companies. Ideally, the practice should start following a total clean out and keep the litter reconditioned thereafter. There is a potential for high ammonia levels in the next flock when deep, built-up litter is windrowed for the first time. Windrowing litter in warmer weather when ventilation rates can be increased, turning the windrows at least once prior to spreading, and using higher rates of litter treatments should reduce this concern. To date we have limited windrowing equipment to perform this procedure on an industry-wide scale. Two of our clean out contractors have purchased windrowing equipment and will start offering this service. Finally, the cost of windrowing and re-spreading litter is higher than conventional crusting. The Delaware Nutrient Management Commission has funded the University of Delaware to conduct a controlled study to validate the waste management, nutrient management and production benefits of this practice. Long term, it is hopeful that in-house composting might be considered for cost-share assistance as an NRCS waste treatment practice.

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Figure 1. In-house composting of litter using the Brown Bear windrowing equipment.